



Title	Three Couch Burns with Heat Release Rate		
Test Type	NFPA 289		
Lab Number	ATFFRL030001		
Test dates	6/25/04	No. Tests	3

Fire Products Collector

A Fire Products Collector (FPC) measures several characteristics of a fire based upon the measured properties of the fire plume. A FPC consists of a collection hood connected to an exhaust duct placed over a fire as shown in Figure 1. The primary fire characteristics calculated from a FPC include heat release rate (HRR), convective heat release rate (CHRR), gas species production, and smoke production. HRR measurements are based on the principle of oxygen consumption calorimetry. CHRR is calculated as the enthalpy rise of gases flowing through the FPC. Gas species production is calculated based on the measured gas concentrations flowing through the FPC. Smoke production is quantified based on optical smoke measurements, which measure the attenuation of light as it passes through the smoke and fire gases in the FPC.

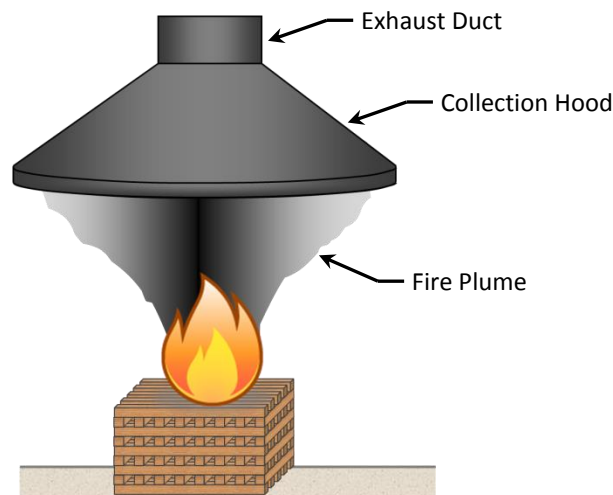


Figure 1. Schematic of a Fire Products Collector

The “Fire Products Collector Description” table identifies which FPC was used in the experiment(s) and summarizes the configuration. Fire Products Collectors were used in accordance with the method defined in FRL Laboratory Instruction “LI011 Fire Products Collectors” [1].

The following table provides a description of the FPC used in the experiment(s). The table includes a description of the FPC, as well as the Calibration factor (C Factor) and E values, which are used to calculate the HRR during an experiment. The C Factor is based

on data from a fire with a known HRR. E is the net heat released per unit of oxygen consumed, a property of the fuel being burned.

Table 1. Fire Products Collector Description

Description	C Factor	E (kJ/kg)
1 MW Square	0.9409	13.1

Experiment Photographs

Digital Cameras are used within the FRL to record digital still photographs during experiments. Digital Cameras used during this test series were used in accordance with the method defined in FRL Laboratory Instruction “LI003 Digital Cameras” [2].

Results for Test 1 (ID 565)

The following figures show all of the still photographs uploaded into the FireTOSS system. The caption below each figure provides the picture's filename as well as any description and elapsed test time associated with the picture.



Figure 2. Pre test
1:17 hr:min,
565_311878



Figure 3. Pre test
1:17 hr:min,
565_311876



Figure 4. Pre test
1:15 hr:min,
565_311874



Figure 5. Pre test
1:14 hr:min,
565_311872



Figure 6. Pre test 32
minutes,
565_311869



Figure 7. Pre test 11
minutes,
565_311868



Figure 8. Pre test 10
minutes,
565_311867



Figure 9. Pre test 9
minutes,
565_311866



Figure 10. Pre test 9
minutes,
565_311865



Figure 11. Pre test 8
minutes,
565_311864



Figure 12. Pre test 7
minutes,
565_311863

Results for Test 2 (ID 563)

The following figures show all of the still photographs uploaded into the FireTOSS system. The caption below each figure provides the picture's filename as well as any description and elapsed test time associated with the picture.



Figure 13. Pre test
14 minutes,
563_311893



Figure 14. 172
seconds,
563_311897



Figure 15. 241
seconds,
563_311894



Figure 16. Post test
10 minutes,
563_311892



Figure 17. Post test
19 minutes,
563_311890



Figure 18. Post test
21 minutes,
563_311886



Figure 19. Post test
25 minutes,
563_311882



Figure 20. Post test
43 minutes,
563_311881



Figure 21.
563_311880



Figure 22.
563_311884



Figure 23.
563_311887



Figure 24.
563_311888



Figure 25.
563_311889



Figure 26.
563_311891



Figure 27.
563_311896



Figure 28.
563_311899

Results for Test 3 (ID 564)

The following figures show all of the still photographs uploaded into the FireTOSS system. The caption below each figure provides the picture's filename as well as any description and elapsed test time associated with the picture.



Figure 29. Pre test
39 minutes,
564_311903



Figure 30. Pre test
39 minutes,
564_311902



Figure 31. Pre test
38 minutes,
564_311900



Figure 32. 3
seconds,
565_311861



Figure 33. 17
seconds,
565_311860



Figure 34. 30
seconds,
565_311859



Figure 35. 41
seconds,
565_311858



Figure 36. 60
seconds,
565_311857



Figure 37. 86
seconds,
565_311856



Figure 38. 110
seconds,
565_311855



Figure 39. 133
seconds,
565_311854



Figure 40. Post test
0 minutes,
565_311851



Figure 41. Post test
2 minutes,
565_311862



Figure 42. Post test
3 minutes,
565_311850



Figure 43. Post test
17 minutes,
565_311849



Figure 44. Post test
17 minutes,
565_311848

Results Summary

The following chart shows the heat release rate of the fire during the experiment. The heat release rate is calculated based on the principle of oxygen consumption calorimetry.

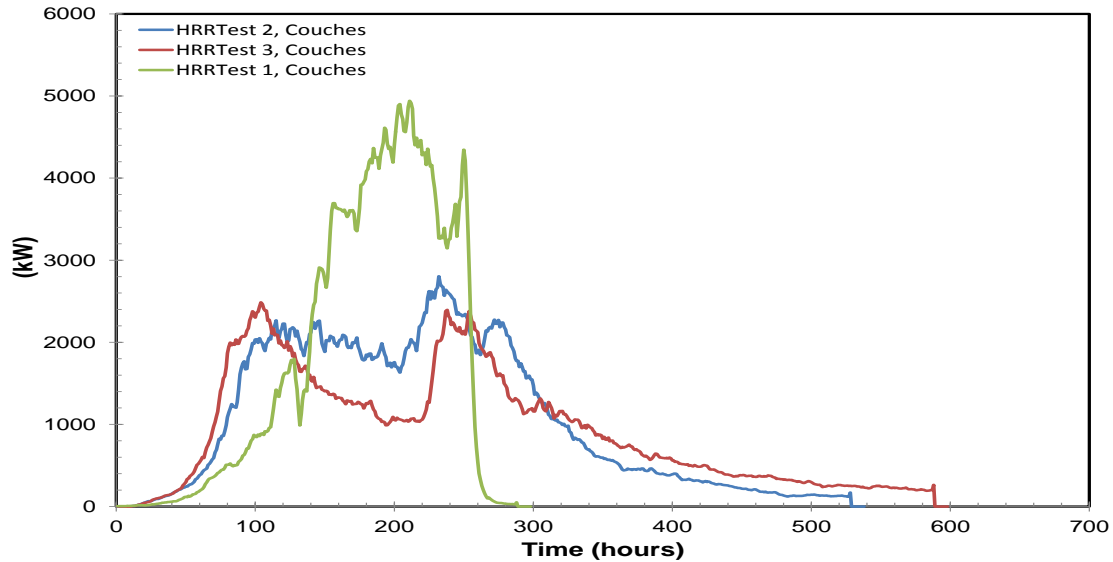


Figure 45. Heat Release Rate

References

1. Laboratory Instruction – Fire Products Collectors – LI011, Bureau of Alcohol, Tobacco, Firearms and Explosives – Fire Research Laboratory, Beltsville, MD.
2. Laboratory Instruction LI003 - Digital Cameras, Bureau of Alcohol, Tobacco, Firearms and Explosives - Fire Research Laboratory, Beltsville, MD